General Installation Manual

General Installation Manual for SANYO HIT Modules. Please read this manual completely before installation or use of SANYO modules. This manual applies to:
HIP-230HDE1, HIP-230HDE1-2
HIP-225HDE1, HIP-225HDE1-2
HIP-220HDE1, HIP-220HDE1-2

INTRODUCTION

Thank you for choosing SANYO HIT PV modules. With proper operation and maintenance, they will provide you with clean, renewable solar electricity for many years. This manual contains important installation, maintenance and safety information. The word "module" as used in this manual refers to one or more PV modules. Keep this manual for future reference.

Disclaimer or Liability

SANYO does not asume responsibility and expressly disclaims liability for loss, damage, or expense arising out of, or in any way connected with installation, operation, use or maintenance by using this manual.
SANYO assumes no responsibility for any infringement of patents or other rights of third parties, which may result from use of modules.
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SANYO reserves the right to make changes to the product, specifications or manual without prior notice.

General Information

The installation of solar modules requires a great degree of skill and should only be performed by qualified licensed professionals, including, without limitation, licensed contractors and licensed electricians.

WARNING

- All instructions should be read and understood before attempting to install, wire, operate or maintain the PV module. Contact with electrically active parts of the module, such as terminals, can result in burns, sparks and lethal shock whether the module is connected or disconnected
- The installer assumes the risk of all injury that might occur during installation, including, without limitation, the risk of electric shock.
- PV modules generate DC electrical energy when exposed to sunlight or other light sources. Although single modules produce only a low voltage and current, shocks and burns are still a hazard.
- To avoid the hazard of electric shock and injury, cover the entire front surface of the PV module with a dense, opaque material such as cardboard box, during installation and handling of the module.
- The shock hazard increases as modules are connected in parallel, producing higher current, and as modules are connected in series, producing higher voltages.
- The shock hazard increases at modules with nominal open-circuit voltage (Voc) in excess of 50V, and/or modules rated for maximum system voltage in excess of 50V.
- To avoid the hazard of electric shock, work only in dry conditions, with dry modules and dry tools.
- Do not stand or step on a module to avoid the hazard of injury and damage to the module.
- Do not puncture or damage the back sheet of a module, to avoid the hazard of electric shock and fire.
- To avoid the hazard of electric shock and injury, children and unauthorized persons should not be allowed near the installation of PV modules
- To avoid the hazard of electric shock and injury, be sure to completely ground all modules.
- To avoid the hazard of electric shock, fire, and injury, do not disassemble the module, nor remove any part installed by the manufacturer.
- Unauthorized persons should not open the cover of the junction box to avoid the hazard of electric shock
- Do not touch terminals while a module is exposed to light. Provide suitable guards to prevent yourself from direct contact with 30VDC or greater to avoid the hazard of electric shock.
- When carrying a module, two or more people should carry it by ist frame and wear non-slip gloves to avoid injury by a slipping module, to a foot, or cuts by the edge of a frame, etc
- Do not carry a module by its wires or junction box, to avoid the hazard of electric shock, injury or damage to the module.
- Do not drop anything on the surface of a module, to avoid the hazard of electric shock, injury and damage.
  To avoid the hazard of electric shock and fire, be sure that all other system components are compatible, and they do not subject the module to mechanical or electrical hazards.
  Since sparks may occur, do not install the module where flammable gases or vapors are present.
  Never leave a module unsupported or unsecured.
  Do not drop a module.
- Do not use or install broken modules to avoid the hazard of fire, electric shock, and injury.
- Do not artificially concentrate sunlight on a module to avoid the hazard of fire or damage.
- Do not touch the junction box terminals to avoid the hazard of electric shock and injury.
- Do not change the wiring of bypass diodes to avoid the hazard of electric shock and injury.
- Do not disconnect terminals while PV modules generate electricity and connect electrical load to avoid the hazard of electrical shock.

CAUTION

- Use a module for its intended purpose only.
- Do not treat the back sheet or front surface with paint or adhesives, to avoid reducing its functionality, damage, inoperable conditions, and other unknown problems.

GENERAL SAFETY

- Follow all permission, installation and inspection requirements.
- Before installing modules, contact the appropriate authorities to determine permissions, installation and inspection requirements, which should be followed.
- Be sure that the construction or structure (roof, façade, etc.) where the modules are being installed has enough strength.
- For modules mounted on roofs, special construction or structures may be required to help provide proper installation support.
- Both roof construction and module installation design have an effect on the fire resistance of a building. Improper installation may contribute to fire hazards. Additional devices such as ground fault, fuses, and disconnects may be required.
- Do not use modules of different specifications in the same system.
- Follow all safety precautions of other system components used.

INSTALLATION

General

- Please read this guide completely before installation or use of the modules. This section contains electrical and mechanical specifications needed before using your SANYO PV modules.
- Modules should be firmly fixed in place in a manner suitable to withstand all expected loads, including wind and snow loads.

- The drilling and addition of ground holes is permitted, but should be avoided whenever possible to avoid damage to the module. When additional ground holes are necessary, they must not penetrate the inner side of the aluminum frame. Caution is advised to avoid accidentally drilling, scratching, or penetrating the back sheet surface of the module. If required, it is recommended to add additional ground holes to the outer aluminum lip area of the module. In such case, additional ground holes must be at least 65mm away from any frame corner.
- For a non-integral module or panel, a statement that the assembly is to be mounted over a fire resistant roof covering rated for the application.
- Appropriate material should be used for mounting hardware to prevent the module frame, mounting structure, and hardware itself from corrosion. Install modules where they are not shaded by obstacles like buildings and trees. Especially pay attention to avoid partially shading the modules by objects during the daytime.
- Please contact your SANYO Authorized Representative with questions regarding mounting profiles for modules if needed.

Notes on installation

- Clearance between the roof surface and module frame is required to allow cooling air to circulate around the back of the module. This also allows any condensation or moisture to dissipate. Install modules so that air can circulate between the roof and the module.
- We recommend installation methods shown in Figure 1. In some areas, local electrical codes may govern the installation and use of PV modules.

Operating Conditions

- SANYO recommends that modules be operated within the following Operating Conditions. An installation location with conditions beyond the Operating Conditions or with other Special Conditions (see below) should be avoided. Operating Conditions of SANYO modules are as follows:

1) The modules should be operated only in terrestrial applications. No space or other Special Conditions (see below).
2) The ambient temperature should be within -20℃ (-4℉) to 40℃ (104℉).
3) The relative humidity should be within 45% to 95%.
4) The installation place should be less than 1,000m (3,280ft) above sea level. Installations more than 1,000m (3,280ft) are allowed only if the wind pressure load for a module is less than 2,400N/m^2 (50PSF).

Special Conditions

1) The ambient temperature and installation place are different from the recommended Operating Conditions.
2) Salt damage is severe at the installation place.
3) Hail and snow damage is excessive at the installation place.
4) Sand and dust damage is excessive at the installation place.
5) Air pollution, chemically active vapors, acid rain, and/or soot, etc. are excessive at the installation place.

SPECIFICATIONS

Notes on specifications

1) Rated electrical characteristics are within 10% of the values measured at Standard Test Conditions (STC). Irradiance of 1000W/m^2, 25℃ cell temperature, and solar spectral irradiance per IEC 60904-3.
2) Under normal conditions, a photovoltaic module may experien ce conditions that produce more current and/or voltage than reported at standard component test conditions. Accordingly, the values of Isc and Voc should be multiplied by a factor of 1.25 when determining voltage ratings, conductor capacities, fuse sizes, and size of controls connected to the module output.
3) The current output for the modules shown in the Specifications is measured at Standard Test Conditions. These conditions may not be frequently observed in actual practice.

Application Class of product

SANYO HIT PV-modules are applied to Application Class A. Application Class A for PV-modules are defined as follows: Class A: General access, hazardous voltage, hazardous power applications Module rated for use in this application class may be used in systems operating at greater than 50VDC or 240W, where general contact access is anticipated. Modules qualified for safety through this part of IEC 61730-1 and IEC 61730-2 and within this application class are considered to meet the requirements for Safety Class II.

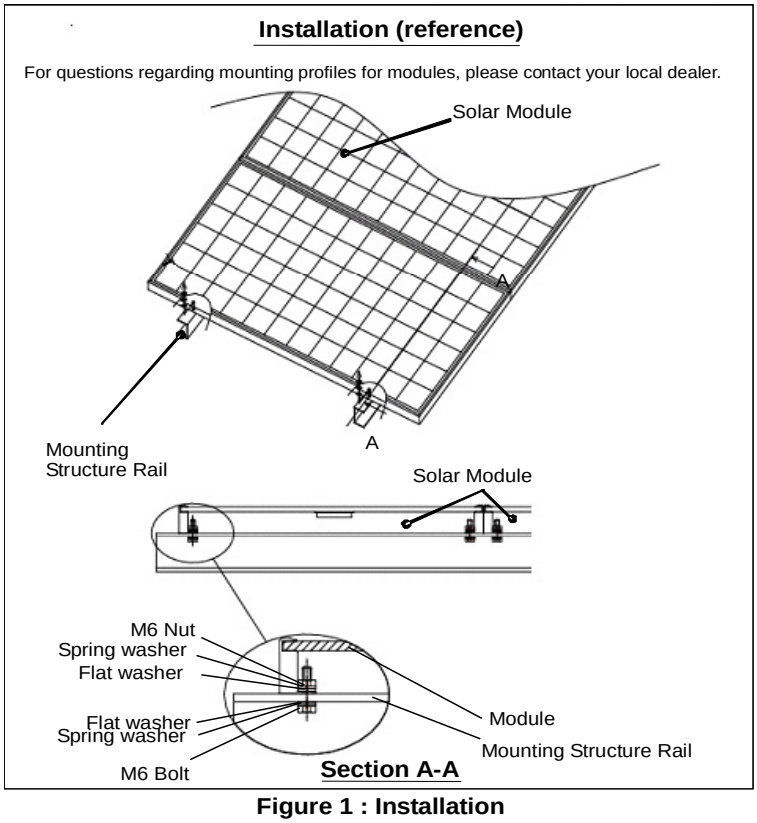

Figure 1 : Installation

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Fire Class of product
Sanyo HIT PV modules belong to the fire Class C that provides to ANSI/UL790. Class C roof coverings are effective against light fire test exposures. Under such exposures, roof coverings of this class afford a light degree of fire protection to the roof deck, do not slip from position, and are not expected to produce flying brands.

Mechanical Loading
The modules should be mounted fixed at the four (4) quarter points by the means shown in Figures 3-1, 3-2, 3-3.
This method offers a maximum load of 2,400N/m^2 (50PSF in static state) on the module surface.

CERTIFICATION
The HIP-xxxHDE1, xxxHDE1-2 Modules comply with the requirements and have been qualified for IEC612115 Ed2, IEC61730-1, -2 and hace CE marking.

WIRING
General
- All wiring should be done in accordance with applicable electrical codes. All wiring should be done by a qualified licensed professional.
- All modules connected in series should be of the same model type. Do not connect modules in parallel without using a connection box.
- Do not disconnect terminals while PV modules generate electricity and connect electrical load to avoid the hazard of electrical shock.
- To avoid hazard of electrical shock and sparks, please connect each cable after confirming the polarity of them is correct.

Module wiring
- The maximum number of modules that can be wired in series is 21 (twenty-one) Modules shall not be wired in parallel without maxium overcurrent protection
- SANYO solar modules are not designed for "off-grid" or battery charging systems, because of their operating voltage. Therefore, it is not recommended to use them to charge batteries without fitting load manager.
- These modules contain factory installed bypass diodes. If the modules are incorrectly connected to each other, the bypass diodes, cables or junction boxes may result damaged.

Array wiring
- The term "array" is used to describe the assembly of several modules on a support structure with associated wiring.
- Use copper wire that is sunlight resistant and is insulated to withstand the maximum possible system open circuit voltage.
- Check your local codes for additional requirements

Earth Ground Wiring
- The kind of the earth construction shall conform to IEC61730-1.
- Bonding shall be by a positive means, such as clamping, riveting, bolted or screwed connections, or welding, soldering or brazing. The bonding connections shall penetrate all non-conductive coatings, such as paint, anodized coatings or vitreous enamel.
- A wiring terminal or bonding location of module intended to accommodate a field installed equipment-grounding conductor shall be identified with the appropriate symbol (IEC 60417-5019(DB:2002-10)) or shall have a green-colored part.
- Grounding should be carried out by the attachment to the module or array frame, o avoid the hazards of electric shock or fire.

Module Terminations
- A junction box as a terminal enclosure is equipped for electrical connections on SANYO modules.
- Modules are equipped with MCTM plugs as a terminal enclosure. Use these MCTM plugs for electrical connections.
- If two or more separable connectors are provided, they shall be configured or arranged so that the other and vice-versa will not accept the mating connector for one, if it will result in an improper connection.
- Please contact your SANYO Authorized Representative with questions regarding other electrical connections if needed.

Junction Box and Terminals
- Modules contain terminals for both positive and negative polarity, and bypass diodes for protection.
- One terminal is dedicated to each polarity (with this polarity symbols engraved onto the body of the juntion box). See Figure 2 for reference.

Conduit
- For applications where wire conduits are used, follow the applicable local codes for outdoor installation of wires in conduits. Minimum diameter of wire conduit is 4mm^2.
- Verify that all fittings are properly installed to protect wires against damage and prevent moisture intrusion.

DIODES
Bypass Diodes
- When the modules in series strings are shaded partially, it may cause reverse voltage across cells or modules, because the current from other cells in the same series is forced to flow through the shaded area. This may cause undesirable heating to occur.
- The use of a diode to bypass the shaded area can minimize both heating and array current reduction.
- All SANYO modules are equipped with factory installed bypass diodes. The factory installed diodes provide proper circuit protection for the systems within the specified system voltage, so that you do not need any other additional bypass diodes.
- Contact your SANYO Authorized Representative for proper diode type, if it is necessary to add or change diodes due to system specifications.

MAINTENANCE
- Some maintenance is recommended to maintain optimal output performance of the solar modules.
- If the module surface becomes dirty, it may reduce output power.
- It is recommended to clean the surface of the module with water and a soft cloth or sponge.
- A mild non-abrasive detergent may be applied for persistent dirt.
- It is also recommended to inspect the electrical and mechanical connections annually.
- If you need electrical or mechanical inspection or maintenance, it is recommended to have a licensed authorized professional carry out the inspection or maintenance to avoid the hazards of electric shock or injury.
- The return of any modules will not be accepted by SANYO unless prior written authorization has been given by SANYO
- As part of our policy of continuous improvement SANYO reserves the right to change product specifications at any time without prior notice.

For further information, please visit
http://www.sanyo-solar.eu
or:
http://www.sanyo.com/solar
or contact a SANYO authorized dealer.

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SPECIFICATIONS

Electrical Specifications			
Model	**HIP-230HDE1** **HIP-230HDE1-1**	**HIP-225HDE1** **HIP-225HDE1-1**	**HIP-220HDE1** **HIP-220HDE1-1**
Cell number in series	60		
Total cell number	240		
Rated Power (Pmax) [W]	230	225	220
Maximum Power Voltage (Vpm) [V]	34.3	33.9	33.5
Maximum Power Current (Ipm) [A]	6.71	6.64	6.57
Open Circuit Voltage (Voc) [V]	42.3	41.8	41.4
Short Circuit Current (Isc) [A]	7.22	7.14	7.07
Cell Type	HIT*		
Maximum System Voltage (Voc) [V]	1000		
Maximum Over-current protection [A]	15		
Factory Installed Bypass Diodes	3		
HIT*: Heterojunction with Intrinsec Thin Layer			

Mechanical Specifications	
Length [mm]	1610
Width [mm]	861
Heigth [mm]	35
Weight [kg]	16.5

Junction Box

1) Negative pole
2) Positive pole
3) 4) MC-3 connector Plugs
5) 6) cable

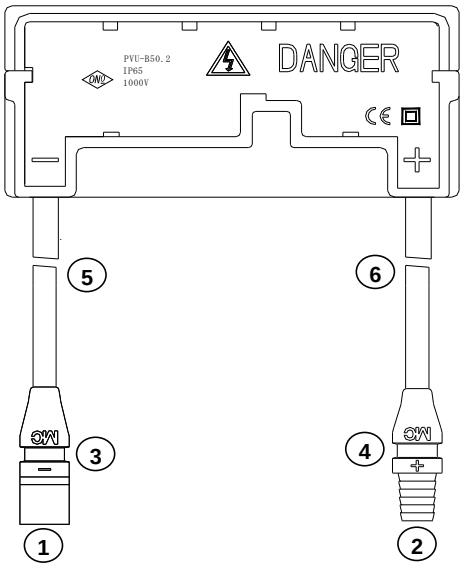


Figure 3: Junction Box

Dimensions

Units: mm
In Case of clamp fixing, attach within shaded range

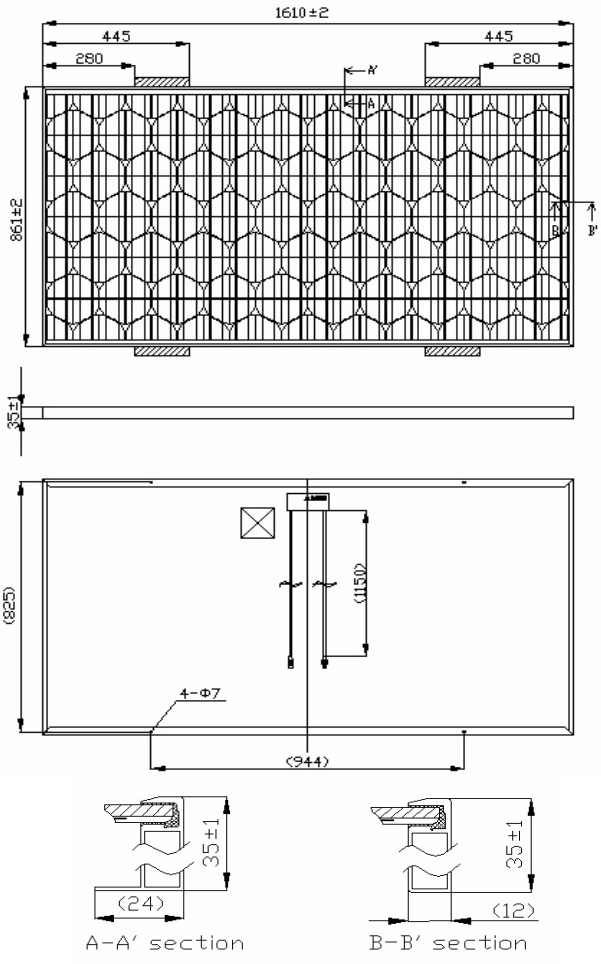
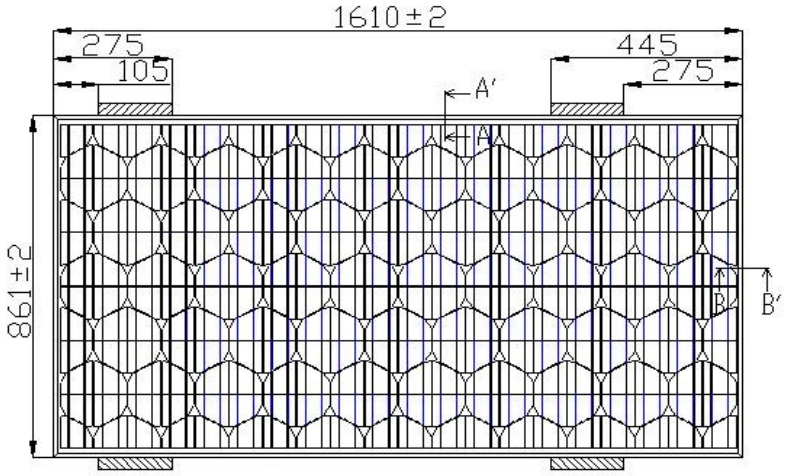


Figure 2.1: Dimensions

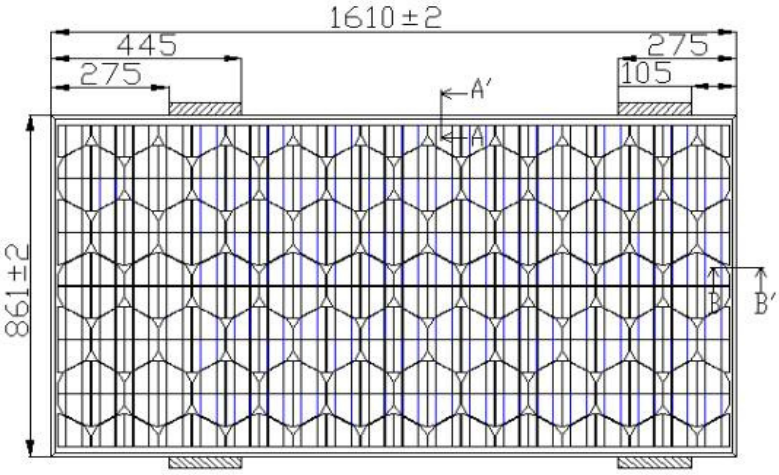
Optional Mounting Range (1)
[Dimensions are in mm]



Note: Fixing span is 1050mm or less

Figure 3-2: Optional Mounting Range

Optional Mounting Range (2)
[Dimensions are in mm]



Note: Fixing span is 1050mm or less

Figure 3-3: Optional Mounting Range